Distribution and Abundance of Summer Bats in Texas

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Introduction

White-nose Syndrome (WNS) is a fungal disease affecting many hibernating bats in North America. It was first discovered in New York State in late 2006 and is now known to be caused by the fungus, *Pseudogymnoascus destructans* (Pd). Since its discovery, it has spread rapidly across the Eastern United States and Canada. The US Fish and Wildlife Service estimates it has resulted in loss of nearly 6 million bats. In some hibernacula, population declines of 9 to 100% have been reported. Many bat species are long lived and slow to reproduce, and bat populations could take many decades to recover from large population declines.

Pd was detected in Texas for the first time in 2017 at 6 Panhandle counties. In 2018, it was detected in 4 additional counties, including 2 in Central Texas. The fungus has now been detected in a total of 10 Texas counties and on 4 bat species: tri-colored bat (*Perimyotis subflavus*), cave myotis (*Myotis velifer*), Townsend's big-eared bat (*Corynorhinus townsendii*) and Mexican free-tailed bat (*Tadarida brasiliensis*). While the fungus has been detected in Texas, signs of the disease have not yet been observed.

Texas is home to 29 species of bats (33 if rare, accidental species are included) with species from both eastern and western North America overlapping in the state. As a result, many naïve species will be exposed to Pd for the first time in Texas. Based on the hibernation patterns and similarity to susceptible species, we expect that as many as 11 Texas species are at risk of being impacted by WNS.

Justification

Bats play a critical role in Texas ecosystems and provide major economic benefits to agricultural producers by consuming significant numbers of agricultural pests.

If impacts of WNS on Texas bats are similar to those in other states, we can expect significant declines in susceptible bat species in the future. Measuring the impact of WNS requires accurate population data and statewide distribution models. Current WNS and bat research funded by TPWD has focused on winter hibernacula surveys since Pd is more easily detected during the winter and several susceptible bat species can be easily detected at winter roosts. However, this methodology is only effective at detecting 6 of 29 Texas bat species, and only considers their winter distributions. Some of these species likely migrate from winter roosts to summer foraging grounds, and their summer distributions could vary considerably from their winter distributions. Understanding habitat use by bats during the summer season will enable better conservation planning for species impacted by WNS.

Therefore, further research is necessary to understand the impacts of WNS on additional Texas bat species not detected by winter hibernacula surveys and also to better understand the distribution of susceptible species already being studied in the winter during other times of year. Acoustic surveys provide a means for detecting up to 16 additional Texas bat species that cannot be detected via hibernacula surveys (Table 1).

Table 1. Texas Bat species not readily detected via winter roost surveys
but likely detectible via acoustics (Loeb 2015).

Scientific Name	Common Name
Eumops perotis	Western mastiff bat
Antrozous pallidus	Pallid bat
Corynorhinus rafinesquii	Rafinesque's big-eared bat
Eptesicus fuscus	Big brown bat
Euderma maculatum	Spotted bat
Lasionycteris noctivigans	Silver-haired bat
Lasiurus blossevillii	Western red bat
Lasiurus cinereus	Hoary bat
Lasiurus intermedius	Northern yellow bat
Myotis californicus*	California myotis
Myotis ciliolabrum*	Western small-footed bat
Myotis thysanodes*	Fringed myotis
Myotis volans*	Long-legged myotis
Myotis yumanensis*	Yuma myotis
Nycticeius humeralis	Evening bat
Parastrellus hesperus	Western parastrelle

*Species at moderate to high level of risk from WNS.

The North American Bat Monitoring Program (NABat) provides a framework for conducting statewide acoustic surveys. NABat is an international effort designed to standardize bat monitoring across North America and is currently in use in many states:

"The purpose of the North American Bat Monitoring Program (NABat) is to create a continental-wide program to monitor bats at local to range-wide scales that will promote effective conservation decision-making and the long-term viability of bat populations across the continent." – Loeb 2015.

This project aims to determine baseline abundance and distribution of acoustically detectible Texas bat species through using a NABat compatible study design. These data will enable documentation of declines from WNS. Special attention should be given to WNS susceptible species (e.g. tricolored bat) that cannot be surveyed with traditional winter hibernacula counts.

Research Objectives:

1) Determine baseline distribution and relative abundance for acoustically detectable bat species across Texas. Priority should be given to WNS susceptible species (e.g. tricolored bat).

2) Model the distribution and predicted abundance of priority bat species in Texas through evaluating habitat and landscape characteristics at survey sites.

3) Contribute relevant data to the NABat Project.

4) Determine seasonal activity patterns of target species and test for potential predictors of activity (temperature, weather, calendar date, etc.)

Preference will be given to proposals that effectively address multiple objectives listed above.

Methods

Survey methodology can vary, but should generally follow protocols outlined in "A Plan for the North American Bat Monitoring Program (NABat)" by Loeb et al. (2015):

1) Collect bat calls using stationary acoustic detectors at 30 plus pre-selected 10 by 10 km grid cells in accordance with the generalized random-tessellation stratified (GRTS) survey design algorithm described in the NABat protocols. Purchasing acoustic detectors may be included in the budget and will become the property of TPWD at the termination of the project.

2) Each grid cell will have 2 to 4 acoustic detectors set to record for at least 4 nights during the months of June and July (following the NABat protocol).

3) Create a final report including bat species composition and abundance at each grid cell and submit all data to TPWD and the NABat project.

Example hypotheses that may be considered:

- Populations of WNS susceptible species will be higher in TX than in similar regions where WNS is established.

- Populations of potentially WNS susceptible species will decline as WNS spreads in Texas.

Expected Management Implications

This project will be critical for monitoring the impacts of WNS on species that do not roost in large hibernacula and can't be surveyed with traditional winter roost surveys. It will create a baseline of bat abundance and distribution data that will be used to determine WNS impacts. If WNS impacts Texas bats as predicted, this data will be critical for creating realistic recovery goals for impacted species. Additionally, this project will contribute to an international bat-monitoring program and will benefit regional bat research and management efforts far beyond the borders of Texas. Many western bat species will encounter the fungus in Texas for the first time and information from this project may be valuable for western states to adequately prepare for WNS.

Questions regarding this RFP should be directed to Jonah Evans. Contact information is provided above.